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Rotatable Handle For Towable Luggage

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Rotatable Handle for Towable Luggage

CROSS REFERENCE TO RELATED APPLICATION(S)

This application claims priority to United States Provisional Patent Application Serial Number 60/452,994, filed March 7, 2003, the entire disclosure of which is herein incorporated by reference.

BACKGROUND

1. FIELD OF THE INVENTION

The present invention pertains to a rotating handle for use with hand towable luggage, in particular to a rotating handle which includes at least three axes of rotation or is otherwise constructed so as to be placed perpendicular to the wheel axis when in the retracted position.

2. BACKGROUND OF THE INVENTION

It is common for many varieties of luggage to be equipped with one or more wheels that enable the luggage to be towed by persons when traveling. Typically, a towable piece of luggage is also provided with a towing member having an towing arm that connects a towing handle to the piece of luggage. The length of the towing arm connecting the towing handle to the piece of luggage helps prevent the luggage from coming into contact with the person's legs and feet as the piece of luggage is being towed and provides for a more comfortable towing position.

The majority of towing members allow a towing handle to be selectively extended from and retracted toward a piece of luggage being towed. The ability to extend and retract the towing member allows the towing member to be unobtrusive when the piece of luggage is not being towed. Furthermore, with the towing member in the retracted position, the piece of luggage can more easily be placed into the trunk of an automobile or into an overhead compartment of an airplane when traveling.

It is common for a wheeled piece of luggage to have an extendable towing member comprised of a pair of parallel telescoping poles, bridged by a towing handle, that slide into separate vertically oriented tubular receptacles rigidly attached to an interior compartment of the piece of the luggage. It is also known to utilize a single-pole telescoping tow member that extends and retracts from a single tubular receptacle centrally positioned between the wheels of a

piece of luggage. In either situation, a piece of luggage having a permanently secured towing member typically has a receptacle for the towing handle such that the towing handle lies flush with the back surface of the piece of luggage when the towing member is retracted. This prevents the towing handle from being obtrusive and reduces the chance of snagging the towing handle on other items, while also improving the aesthetic appearance of the piece of luggage when the piece of luggage is not being towed.

Regardless of the type of towing member, extendable towing members are usually provided with a mechanism for locking the towing member in the extended position. Such locking mechanisms are well known in the art and include such devices as spring-loaded detents, cam locks, and other interference locks. Some locking mechanisms are unlocked by manually operating a release mechanism. Other locking mechanisms, such as many spring-loaded detent mechanisms, are automatically released by simply exerting a force on the towing handle that is sufficient to retract the detent. Additionally, some towing members have locking mechanisms that are capable of locking the towing member in the retracted position.

Despite the convenience of being able to tow a piece of luggage as opposed to carrying it when traveling, towing a piece of luggage can be awkward and uncomfortable. One reason that towing a piece of luggage can be uncomfortable lies in the positioning and the shape of the towing handle of most towing members. As mentioned above, it is common for the towing handle of dual-pole towing members to be a bridge spanning between the poles. Such towing handles are therefore generally oriented horizontal to the surface upon which the piece of luggage is being towed and extend perpendicular to the path along which the piece of luggage is being towed. In this configuration, a user generally grasps the towing handle behind his of her back with his or her wrist rotated to almost its limit of rotation as the principal dimension of the

handle lies parallel to the axis about which the wheels rotate. When towing such luggage long distances, this position can become uncomfortable and the user often finds it necessary to switch hands one or more times to prevent fatigue.

Regardless of the disadvantages in comfort associated with the towing handle configuration as described above, alternative orientations of the towing handles are often not available without compromising other aspects of the utility of the handle or luggage. For example, shaping the handle of an extendable towing member in a manner that would be more comfortable is likely to cause the handle to protrude from the piece of luggage or require a larger receptacle for the handle when the towing member is retracted. Another disadvantage associated with the towing handle configuration described above is that, due to the grasp needed to hold onto the towing handle, the maneuverability of a towed piece of luggage can become limited by the person's inability to further twist his or her wrist.

To get around these problems, some luggage includes rotating handles which can pivot around one or more points of the towing arm member to allow for a user to rotate the handle to a more comfortable position when towing the luggage. The problem with these handles is that they are generally limited to traditional arrangements in their stored position. In particular, because the internal space of the luggage is used for packing, it is undesirable to have the towing handle project into the internal volume of the luggage more than is absolutely necessary. Further, so as not to damage the towing handle when the luggage is checked or stored, it is desirable that the luggage handle not significantly project beyond the external frame of the luggage to prevent it from being snagged on items during airport handling.

Because of these dual issues, handles which allow for the wrist to be turned to a more convenient positioning generally rotate to a position where the towing handle is parallel to the

bridge on the dual poles (or the upper surface of the towing arm if a monopole arm is used) when they are retracted. That is, the principal dimension of the grip portion of the towing handle is placed parallel to the wheel rotation axis when the arm is placed in its retracted position. In this way, the towing handle takes up less space in the internal portion of the luggage as the handle is essentially stored in space that comprises a side of the generally parallelepiped luggage frame. This is also space that is at least partially lost due to the telescoping arm action anyway.

If one was to attempt to stow a rotating handle of the prior art at a direction perpendicular with the wheel rotation axis and parallel to the direction of movement, the handle would extend undesirably into the internal volume of the bag taking up space which would better be used for storage and/or would be forced to extend outside the frame of the baggage and would be subject to damage.

The problem with prior art handles arranging the principal dimension of the grip portion of the handle parallel to the wheel rotation axis when in the retracted position is that it generally requires the user to place their wrist in an uncomfortable rotated position in order to grasp the towing handle and then rotate their wrist to get the towing handle to the towing position. Further, in some cases, for instance in handles such as those described in US patent application 2003/0132079 and PCT patent publication WO 03/053186, the problem is particularly noticeable because the handle is located between the tubes of the towing arm and therefore the user must first raise the arm to its extended position by grasping the bridge, and then rotate the handle into the towing position by reaching between the telescoping poles and rotating the handle into position, and then generally, completely change their grip to grip the grip portion of the handle when towing. This multi-part movement is hard on the wrist as the wrist often needs to be rotated to both extend the arm and rotate out the handle, can often require two hands, and can be

time-consuming when the user is trying to get the handle stowed quickly to get the bag checked or into an overhead storage compartment. It can also be difficult when a user is trying to get out of the way of others who s/he is blocking during the time of raising the handle. Effectively, because of the storage position placing the handle between the poles the user must first move the handle to a "packed configuration" and then lower the packed handle assembly to the retracted position. This is a two step process.

Packing the handle and then moving the handle from the expanded to retracted position or vice versa creates a significant amount of extra effort as it does not allow for a user to have a handle which is easily graspable from the stowed position, and maneuverable into a position where the user's hand can act more naturally without requiring multiple hand movements, two hands, or wrist contorting motion.

SUMMARY

Because of these and other problems in the art, described herein is a towing member where the handle can be stored in the luggage in a retracted position with the principal dimension of the grip portion of the handle arranged to be generally perpendicular to the wheel rotation axis and parallel to the top face of the piece of luggage, while still allowing two degrees of free rotation in the extended position. The towing arm of an embodiment has at least three axes of rotation about which it can rotate, two of the axes being parallel.

The relative movement between the towing handle and the towing arm of the towing member allows a person to grasp the towing handle in a comfortable position when extending the handle and to extend and maneuver the handle in one fluid movement to a comfortable towing position without having to unduly bend the wrist. Additionally, the relative movement between the towing handle and the towing arm of the towing member may increase the maneuverability of a towed piece of luggage by eliminating the need for a person to adjust his or her grip on the towing handle when attempting to redirect the piece of luggage. Furthermore, the relative movement between the towing handle and the towing arm allows the towing handle to be repositioned when the towing arm is retracted such that it is unobtrusive and does not otherwise interfere with the use of the piece of luggage.

In an embodiment, there is described herein a hand towed piece of luggage comprising: a piece of luggage; at least one wheel connected to the piece of luggage, the wheel having a wheel rotation axis; a towing arm including a pole, the pole having a length with opposite proximal and distal ends, the distal end of the pole being arranged to move from a retracted position to an extended position; and a towing handle having a grip portion with a principal dimension, the towing handle operatively connected to the distal end of the towing arm for pivoting movement

of the towing handle about at least two pivot axes relative to the distal end of the pole in the extended position; wherein, in the retracted position, the grip portion is arranged so the principal dimension is generally perpendicular to the wheel axis

In an embodiment the above described handle also includes one of the at least two pivot axes being oriented substantially parallel to the wheel rotation axis or the at least two pivot axes comprising a first axis and second axis that intersect each other in generally perpendicular relation.

In another embodiment, the movement between the retracted and the extended position is telescoping movement such as with the pole being comprised of at least two telescoping sections that are slidably attached to each other for relative telescoping movement. The locking mechanism may be operatively connected so the pole can be locked in the extended position.

In another embodiment the towing arm is a dual-pole towing arm including at least two poles or a monopole towing arm including only a single pole.

In another embodiment, there is described a hand towed piece of luggage comprising: a piece of luggage; at least one wheel connected to the piece of luggage, the wheel having a wheel rotation axis; a towing arm including a pole, the pole having a length with opposite proximal and distal ends, the distal end of the pole being arranged to move from a retracted position to an extended position; and a towing handle having a grip portion with a principal dimension, the towing handle being operatively connected to the distal end of the towing arm for pivoting movement of the towing handle about at least three pivot axes relative to the distal end of the towing arm.

In any of the above described embodiments, at least two of the axes may be parallel to each other or at least two of the axes may be perpendicular to each other.

In another embodiment, the towing handle is connected to the distal end of the towing arm via a pivot mechanism comprising: a knuckle; and an intermediate arm having an upper portion and a lower portion with a length therebetween; wherein, the handle rotates about a first of the at least three axes of rotation relative to the knuckle; wherein the knuckle rotates about a second of the at least three axes of rotation relative to the intermediate arm; and wherein the intermediate arm rotates about a third of the at least three axes of rotation relative to the towing arm.

In any of the above described embodiment, the first axis of rotation and the second axis of rotation may be perpendicular, the third axis of rotation and the second axis of rotation may be parallel, when the towing arm is in the retracted position the principal dimension of the grip portion and the length of the intermediate arm may be arranged generally parallel to each other, or the towing arm may be arranged perpendicular to the grip portion.

In any of the above described embodiments the luggage is of generally parallelepiped shape having a top face and a back face. When the towing arm in the retracted position, the principal dimension of the grip portion may be generally parallel to, or co-planar with, the top face or parallel to or co-planar with the back face. When the towing arm is in the retracted position, the length of the intermediate arm may be generally parallel to the top face or the principal dimension of the grip portion may be generally arranged at about a 90 degree angle with the towing arm.

In any of the above described embodiments, the towing arm may be a dual-pole towing arm including at least two poles wherein the poles may be connected at their distal ends by a bridge and at least one of the at least three axes may be parallel to, or co-linear with, the bridge, or a monopole.

In a still further embodiment, there is described a hand towed piece of luggage comprising: a piece of luggage arranged to generally be a parallelepiped and having a top face and a bottom face on opposite sides thereof; at least one wheel connected to the piece of luggage toward the bottom face thereof, the wheel having a wheel rotation axis; a towing arm including a pole, the pole having a length with opposite proximal and distal ends, the distal end of the pole being arranged to move from a retracted position to an extended position; and a towing handle connected to the distal end of the towing arm so as to be able to rotate about the distal end of the towing arm, the towing handle including a grip portion with a principal dimension; wherein, in the retracted position, the grip portion is arranged so the principal dimension is generally perpendicular to the wheel axis and the principal dimension is generally parallel to the top face.

BRIEF DESCRIPTION OFF THE DRAWINGS

FIG. 1 depicts an embodiment of a piece of luggage including an embodiment of a towing arm in the retracted position.

FIG. 2 depicts the embodiment of the piece of luggage including the embodiment of towing arm shown in FIG. 1 with the towing arm extended.

FIG. 3 provides an alternative view of the embodiment of FIG. 2.

FIG. 4 provides another alternative view of the embodiment of FIG. 2.

FIG. 5 provides a view of the embodiment of FIG. 1 with the handle at its post "jump" position.

FIG. 6 is a view of an embodiment of a pivotal towing handle in the compact retracted arrangement separated from the luggage.

FIG. 7 is a view of the embodiment of FIG. 6 in the more open expanded arrangement after rotation from the arrangement of FIG. 5 about the second and third axes of rotation.

FIG. 8 is a view of the embodiment of FIG. 6 showing rotation about the first axis of rotation.

FIG. 9 provides a partial exploded view of the embodiment of FIG. 6.

FIG. 10 provides a detail view of an embodiment of an intermediate arm.

FIG. 11 provides a detail exploded view of an embodiment of a pole shoulder and some associated components.

FIG. 12 provides a detail view of the interaction of some of the internal components of the locking structure.

FIG. 13 provides a view of the luggage of FIG. 1 in a preferred arrangement when towed.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

It is best to begin the discussion by describing the interaction of a human being with wheeled luggage while towing it. In order to put as little strain on the wrist as possible when towing the luggage, the user will generally want to be able to grasp a towing handle and hold the handle in a natural position where their wrist, and also preferably shoulder, are not rotated. The preferred position is at their side with the fingers curled toward their leg. As should be apparent, to grasp a towing handle (105) in this position, the principal dimension (171) (basically the "length" of the grip) of the grip portion (134) of the handle (105) (the portion which is rolled into the fingers) is generally arranged so as to be basically parallel to the surface on which the luggage (101) is rolling (and the direction of motion), and perpendicular to the wheel rotation axis (191) which is the axis about which the wheels (119) rotate. That is the principal dimension (171) of the grip portion (134) of the handle (105) essentially "points" along the direction the user is moving. This is shown in the diagram of FIG. 13. In this position, it is further preferable that the handle (105) also be able to rotate around two perpendicular axes when extended to help allow the user to maintain this positioning when traveling and to allow the handle (105) to be placed in this position, or in any of a multitude of other positions.

Because rolled luggage is generally pulled with the back face (113) of the luggage (101) at an angle to the surface over which it is being pulled as shown in FIG. 13 with the wheels (119), which are generally located toward the interface of the back face (113) and the bottom face (114) rolling on the ground, a handle (105) arranged as described above, if retracted directly toward the luggage (101), will generally require a large area of recess in the luggage (101), and will create a significant loss of luggage (101) volume, or will extend outside of the frame of the luggage (101). Both these results are undesirable as they decrease the usefulness of the luggage

(101). The embodiments discussed herein are generally designed to retract into a position that generally conforms with the shape of the outside surface of the luggage (101), while at the same time not requiring significant wrist or other rotation on the part of the user to extend from the retracted position to the preferred towing position as shown in FIG. 13 and vice versa. That is, the embodiments discussed herein are designed to have a towing handle (105) whose principal dimension (171) of the grip portion (134) is perpendicular to the wheel rotation axis (191) when the towing member (100) is in the retracted position. The handle also preferably provides for at least one rotational axis when in the extended position.

An embodiment of such a towing member (100) adapted and configured to be an integral part of a piece of luggage (101) is shown in the FIGS. 1 through 5. As shown in the FIGS., the towing member (100) of an embodiment is attached to a piece of luggage (101) and is generally comprised of an extendable towing arm (103), a towing handle (105), and a pivot mechanism (107) comprising a knuckle (301) and intermediate arm (401). Although shown attached to an upright suitcase, the towing member (100) is not limited to this use and can be used with other types of wheeled luggage such as, but not limited too, backpacks, garment bags, computer bags, duffel bags, any other type of wheeled bag, and/or with wheeled carts for luggage.

The luggage (101) is preferably of generally parallelepiped shape having wheels (119) attached toward the intersection of the back face (113) and the bottom face (114). The wheels (119) rotate about a wheel rotation axis (191). The towing handle (105) is preferably attached so as to extend upward and/or backward from the back face (113) around the interface between the back face (113) and top face (111).

As shown in FIGS. 1 through 5, the towing arm (103) of the towing member (100) preferably comprises a dual-pole telescoping member. In a dual-pole towing arm (103) there are

two poles (131) and (133) joined by a bridge (135) at their distal ends (136). This bridge (135) will generally be relatively parallel to the top face (111) of the luggage (101) as shown in the FIGS. In a particular embodiment, the bridge (135) will be generally parallel to the line of intersection (119) of the top face (111) and back face (113) of the piece of luggage (101) and also generally parallel to the wheel rotation axis (191). In an alternative embodiment, the dual pole towing arm (103) may be replaced by a monopole towing arm. In that case, there is no bridge (135). However, the top of the monopole towing arm will generally include a top surface which may have a pin attached to the top thereof to serve as the third axis (155) as discussed in more detail later in the disclosure or other rotational mount mounted to the end thereof. Generally, the angle of this pin will also be parallel to the rotational axis (191) of the wheels (119).

In the dual-pole towing arm (103) embodiment pictured, each pole (131) and (133) includes a proximal end (not shown) that is slidably engaged with the piece of luggage (101) and an opposite distal end (136) that can be retracted toward and extended away from the piece of luggage (101). The proximal and distal end (136) are separated by a length. Each pole (131) and (133) is preferably formed of aluminum, steel, or other suitably strong materials and they connect to the luggage (101) in a telescoping fashion. Each pole (131) and (133) may either telescope as a single part, or include multiple subparts which also telescope relative to each other. The poles (131) and (133) of the towing arm (103) preferably extend side-by-side along the length of the towing arm (103) and are preferably rigidly connected to each other by bridge (135) at the distal ends (136) thereof. The length of the poles (131) and (133) may be straight or curved along their length and may have any cross sectional shape. One of ordinary skill in the art would recognize that the dual-pole and bridge (135) arrangement of towing arm (103) is

essentially similar to known prior art devices, however in the depicted embodiment, the bridge (135) has been modified to allow for the third axis (155) of rotation as discussed below. In an alternative embodiment, the user could grasp the bridge (135) and use that as a handle to tow the luggage (101).

The towing handle (105) of the depicted embodiment is preferably formed of polymeric material and metal. The towing handle (105), when assembled, is preferably of generally offset "T"-shape and comprises a grip portion (134) having opposite free ends (136) and a principal dimension (171) therebetween. The principal dimension (171) effectively provides the dimension of the grip portion (134) which would generally represent a line extending through the grip of the hand (from thumb to pinky finger) and generally under the fingers when the hand is curled about the grip portion (134). The principal dimension (171) will usually be linear even if the grip portion (134) is not. There is also included a stem portion (138) which intersects the grip portion (134) and extends preferably perpendicularly therefrom. It is also preferable that the stem portion (138) be offset from the center of the grip portion (134), but that is by no means required.

In alternative embodiments, the grip portion (134) may be connected to the stem portion (138) through the inclusion of additional portions. For instance, the grip portion (134) may connect to the two open ends of a "U"-shaped support (not shown) with the bottom of the U-shaped support connecting to the stem portion (138) (essentially forming a hollow rectangle as handle (105)). In a still further embodiment, the grip portion (134) may comprise a portion of a circle or similarly rounded shape where another portion of the circle is connected to the stem portion (138). The handle (105) also preferably includes a button (143) which is generally depressible through a portion of the handle (105).

A bearing surface (140) is formed at the end of the stem portion (138). As shown in FIG. 9, the towing handle (105) also includes a handle pivot shaft (142) that is preferably formed of metal and is centered in and protrudes perpendicularly from the stem portion (138) bearing surface (140). A first end (146) of the handle pivot shaft (142) extends into the handle grip portion (134) and forms a hollow paddle (851) while the second end (950) extends from the bearing surface and into the knuckle (301). The stem portion (138) of the towing handle (105) is preferably molded with a bore hole (173) in which is placed the handle pivot shaft (142). The handle pivot shaft (142) provides for a first axis of rotation (151) where the handle (105) can rotate about the knuckle (301) by rotation of either or both the knuckle (301) and towing handle (101) rotating about the handle pivot shaft (142).

The handle pivot shaft (142) may be moveable relative to the grip portion (134), stem section (138), and/or knuckle (301) to provide for a locking or unlocking movement via depression of the button (143). In the embodiments depicted in FIGS. 9 through 12, the handle pivot shaft (142) may be moveable through the depression of the button (143) or similar device displacing slide shaft (853) which in turn raises hollow paddle (851) into the grip portion (134). When raised, the hollow paddle (851) slides from a toothed cog (855) on the upper surface of knuckle (301). Once clear of the toothed cog (855), the grip portion (134), and handle pivot shaft (142), may rotate relative to the knuckle (301). Therefore in this embodiment, the handle pivot shaft (142) is not allowed to rotate relative to the grip portion (134).

Alternatively or additionally, the button (143) may trigger other locking structures such as the towing handle (105), knuckle (301) or intermediate arm (401). Looking at FIGS. 9 through 12, when the handle pivot shaft (142) is raised, the bottom portion of it clears hole (857) in the upper portion (405) of intermediate arm (401). However, the handle pivot shaft (142) is

preferably hollow, and inside the hollow internal opening (861) extends secondary pivot shaft (859). The hollow internal opening (861) is preferably of generally circular cross section as is the secondary pivot shaft (859). Therefore, the handle pivot shaft (142) can rotate about the secondary pivot shaft (859) placed in the hollow internal opening. Once the handle pivot shaft (142) is clear of the hole (857), it should be clear that rotation about the second axis (153) is unlocked. Thus the handle pivot shaft (142) can move between hole (857) and hole (867). Further, as handle pivot shaft (142) moves toward the hole (867), the flat side of the part circle depression (869) pushes the telescope release pin (865) toward the lower portion (147) of the intermediate arm (401). The trapezoid shaped pusher (871) on the end of the telescope release pin (865) then depresses the telescope pin (873) of each of the poles (131) and (133). This depression is transferred to the locking pins (875) in each of the poles (131) and (133) unlocking the telescoping motion of the poles (131) and (133) as well.

Depression of the button (143) may therefore serve to move the handle pivot shaft (142) to disengage the locking mechanisms which serve to lock or unlock any or all of the available rotations about any or all of the available rotation axes and/or related to the extension of the towing arm (103). In the depicted embodiment, depression of the button (143) unlocks rotation about the first and second axes (151) and (153) and the arm telescoping motion. While this particular arrangement of locking and unlocking is used in the depicted embodiment, one of ordinary skill in the art would understand that other locking mechanisms such as, but not limited to, those described in United States Patent Application 10/238,390, the entire disclosure of which is herein incorporated by reference, could be used in other embodiments.

The bearing surface (140) of the towing handle (105) is in contact with a related bearing surface (303) located in the knuckle (301) so that the two bearing surfaces (140) and (303) rotate

relative to each other around the first axis of rotation (107) when button (143) is depressed (unlocking the system). The knuckle (301) further comprises, towards the end opposite the bearing surface (303) and toothed cog (851), a U-shaped flange (305), or other connector, with a hole (307) therethrough. The U-shaped flange (305) in turn extends over both sides and an upper portion (405) of the intermediate arm (401). A rotation pin (340) is placed though holes (307) in the flange (305) and through a hole (407) in the upper portion (405) of the intermediate arm (401) to allow the knuckle (301) to rotate about a second axis of rotation (153) relative to the intermediate arm (401).

The second axis of rotation (153) is arranged to be generally perpendicular to the first axis of rotation (151) which provides for a great deal of flexibility of position of the handle (105) relative to the towing arm (103). In particular, the handle (105) can be rotated around the second axis by rotating the knuckle (301) and handle (105) assembly relative to the intermediate arm (401). This may be used to place the principal dimension (171) of the grip portion (134) so that it is relatively parallel to the ground and the direction of motion when the poles (131) and (133) are tilted at an angle to the ground as shown in FIG. 13. The first axis of rotation (151) would then allow for handle (105) to rotate in a plane parallel to the ground by rotating the handle (105) relative to the knuckle (301) as shown in FIG. 8. This second degree of rotation allows for the user to turn the handle (105) to place it in a more comfortable alignment. In particular, they can turn the handle (105) about the first axis (151) when changing the direction of the luggage.

In an alternative embodiment, rotation about the first axis (151) can be eliminated and only rotation about the second axis (153) may be included. In a still further embodiment, rotation about one or both axes may be limited to float within a predetermined number of separate locking positions. For example, 5-25 degrees of motion in each direction may be

available freely (or against a biasing force) in any locked position, with there being 2-6 different locked positions available to each axis of rotation. When unlocked, the rotation is free until the handle is placed in one of the locked positions and allowed to lock. In the depicted embodiment of FIG. 13, the holes (857) and (867) may have a slightly greater internal diameter than the external diameter of the handle pivot shaft (142) to provide such float. The cuts (881) in the toothed cog (855) may also have a slightly greater width than the width of the hollow paddle (851) to produce a similar float.

As should be apparent, the two axes of rotation (151) and (153) of the handle (105) when the towing handle (103) is in the extended position provide for benefits to the movement of the luggage (101). In particular, the two axes of rotation (151) and (153) generally allow for the principal dimension (171) of the grip portion (134) to be aligned parallel to the surface on which the luggage (101) is being rolled and parallel to the direction of the user's motion as the user pulls the bag. This then places the grip portion (134) at a comfortable position for the hand during luggage (101) towing as shown in FIG. 13.

The components so far discussed are principally used when the towing arm (103) is in the extended position and the rotation about the two axes (151) and (153) is desired in the extended position. The remaining portion of the pivot mechanism (107) is principally directed to arranging the handle (105) for storage when the towing arm (103) is in the retracted position, without taking up excessive space in the frame or internal volume of the luggage (101).

The intermediate arm (401) is preferably formed of a metal, although plastics or other materials may be used. The intermediate arm (401) is generally of a "T" or "I" shape with the upper portion (145) having a first bore hole (411) therethrough and the lower portion (147) having a second bore hole (421) therethrough and there being a length therebetween. The lower

portion (147) includes bearing surfaces (461) formed at opposite sides of the lower portion (147) which are preferably parallel to and aligned with each other. The upper portion (145) generally includes bearing surfaces (465), which are generally in similar arrangement to bearing surfaces (461). The upper portion also includes the two holes (857) and (867) for the handle pivot pin (142). The second bore hole (421) extends through the bearing surfaces (461) generally perpendicularly from generally the center of the first bearing surface to generally the center of the other bearing surface. The first bore hole (411) is preferably similarly arranged with regards to bearing surfaces (465). The intermediate arm (401) is preferably constructed of two sections (409) and (407) in the depicted embodiment.

There are two pole shoulders (601) and (603) each of which is connected to the distal end (136) of one of the poles (131) and (133) and each of which is generally an approximately 90° angle bend of material and has a bearing surface (126) with a channel (651) and lip (653) extending therefrom. Each of the pole shoulders (601) and (603) includes a bore hole (611) or (613) through the channel (651), lip (653) and bearing surface (126) and in each bore hole (611) and (613) there is placed a telescope pin (873) which extends from the bore hole (611) of the first shoulder (601), into the bore hole (421) in the lower portion of the intermediate arm (401) and from the bore hole (613) of the second shoulder (603) into the bore hole (421). This arrangement allows intermediate arm (401) to rotationally move about the telescope pins (873) with the bearing surfaces (461) and (463) in contact with the bearing surfaces (126). In the depicted embodiment, the intermediate arm also rotates relative to the lip (653) and channel (651) having an extension which rides in the channel (651). This in turn holds the two pole shoulders (601) and (603) to the intermediate arm (401).

The lip (653) and channel (651) arrangement also provides for resilient support of the intermediate arm (401) at two or more positions relative to the rotation about the third axis (155). In particular, in the bearing surfaces (126), there is a hole (671) which includes spring (673), onto which is placed a ball bearing (675)

When assembled, the ball bearing (675) is pushed by spring (673) into the bearing surface (411) or (413). The bearing surfaces (461) and (463) each include two hemispherical indents (467). As can be seen, when the ball bearing (675) lines with an indent (467), the spring (673) pushes the ball bearing (675) into the indent (467) which provides resilient detention of the intermediate arm (401) at that position. The resilient detention is released by simply providing sufficient angular force on the intermediate arm (401) to overcome the spring's (673) biasing force and push the ball bearing (675) back into the hole (671). The intermediate arm (401) can then freely move about the third axis (155) until another hemispherical indent (467) aligns with ball bearing (675). The telescope pins (873) are generally parallel to the rotation pin (340) which extends through the first bore hole (411) in the upper portion (145) of the intermediate arm (401) with bearing surfaces (465) and (467) in contact with the inside surfaces of the U-shaped flange (305).

The telescope pins (873) provide for a third axis of rotation (155) allowing the intermediate arm (401) to rotate relative to the poles (131) and (133). In the depicted construction, the lower portion (147) of the intermediate arm (401) actually forms a portion of the bridge (135). This is by no means required, and in an alternative embodiment, the rotational connection could be designed to be mounted to rotate externally to the bridge (135).

In an embodiment, there may also be included a biasing member which can serve to bias the intermediate arm (401) to a particular rotational position relative to the arm portions (131)

and (133) and about the telescope pins (873). The biasing member, in another embodiment, may additionally or alternatively bias the intermediate arm (401) to a position relative to the knuckle (301) about the rotation pin (340).

One of ordinary skill in the art would understand that the depicted components of FIG. 9 and the above description of locking and rotation components represent merely one exemplary embodiment of components which may be used to accomplish motion about the three axes (151), (153), and (155) and that alternative mechanisms, systems, devices and methods can be used in other embodiments.

It should be clear that the handle (105) of this embodiment has three axes of rotation. The first axis of rotation (151) is generally perpendicular to the bridge (135), while the remaining two axes (153), and (155) are parallel to the bridge (135) (the third axis (155) is in fact collinear with the bridge (135) in the depicted embodiment). The second (153) and third axes (155) also remain generally parallel to the wheel rotation axis (191) of the piece of luggage (101) to which the towing member (100) is ultimately attached while the first axis (151) is generally perpendicular thereto.

FIG. 8 shows the rotation of handle (105) about the first axis of rotation (151) with the handle (105) in one position and two ghost images (501) and (503) of the handle (105) also shown for reference.

The transition between FIGS. 6 and 7 shows the handle (105) rotating about the second axis (153) and third axis (155). The third axis (155) is generally parallel to the second axis (153) and is also generally parallel to the bridge (135) as discussed above. In addition to providing for additional positioning possibilities for the handle (105) for the comfort of the user, the use of the three axes (151), (153), and (155) may also provide for a more compact positioning of the handle

(105) when the handle (105) is retracted into the luggage (101) while also allowing the handle (105) to be easily grasped and extended from its retracted position. In particular, the handle (105) may be in the position shown in FIG. 7 when in the extended position, but may be in the position shown in FIG. 6 when in the collapsed position.

As should be visible from the FIGS., the arrangement of components of FIG. 6 is significantly more compact than the arrangement of components in FIG. 7. This allows for the entire towing member (100) to take less space in the frame of the luggage (101) when the towing arm (103) is placed in the retracted or stored position while still allowing the towing member (100) to retract generally within the parallelepiped frame of the luggage (101). In the embodiment of FIG. 6, the length dimension of poles (131) and (133) and the principal dimension (171) of the grip portion (134), which are generally the two most elongate dimensions, are arranged at a relatively right angle to each other. Further, the length of the intermediate arm (401) and principal dimension (171) of the grip portion (134) are arranged relatively parallel to each other and in close proximity. The arrangement of FIG. 6 may not be comfortable for a user as the bridge (135), handle (105), and intermediate arm (401) may be too compactly arranged to allow a user to place their fingers around the grip portion (134) and to comfortably use the handle (105) to tow the luggage (101). However, the arrangement is fairly compact on each side of the angle.

This arrangement can allow for the towing member (100), and specifically the handle (105), to be nested within a smaller portion of the luggage (101) while still being positioned so that the grip portion (134) is generally perpendicular to the bridge (135) and wheel rotation axis (191) when the towing arm (103) is retracted. This can improve the ease of extending the handle (105) as discussed later. In particular, the 90 degree angle arrangement provides for nesting into

each of the back face (113) and top face (111) of the luggage (101) around the interface between the two faces (113) and (111). The interface is also arranged at a generally ninety degree angle.

While in the arrangement of FIG. 6, rotation of the handle (105) is generally quite hampered by the positioning of the bridge (135) and the intermediate arm (401). In particular, the handle (105) generally cannot rotate about the first axis (151) as the handle (105) would hit the bridge (135) and/or the intermediate arm (401). In the embodiment of FIG. 7 however, by opening up the handle (105) about the second (153) and third (155) axes, the handle (105) is allowed to freely rotate about the first (151) and second axis (153).

Simply comparing FIG. 6 to FIG. 7 shows how less volume is required to nest the arrangement of FIG. 6 compared to FIG. 7. This more compact arrangement is particularly desirable as it allows the handle (105) and towing arm (103) to be protectively retracted into a piece of luggage (101), without overly sacrificing space in the luggage (101).

As shown in FIG. 1, when the handle (105) is retracted into the luggage (101), the handle (105) (which is placed in the arrangement of FIG. 6) can be nested inside a receptacle (801) as shown. When the handle (105) is extended from the luggage (101) through telescoping of the towing arm (103), the handle (105) can expand to the arrangement of FIG. 7 as has been previously shown in FIGS. 2 through 4. In these FIGS., the handle (105) is shown after extension of the towing arm (103) and with the handle (105) in the arrangement of FIG. 7. Effectively a larger, more open, and more comfortable handle (105) arrangement can be used because of the use of the third axis (155) without having to dramatically increase storage space and while still storing the handle (105) with the principal dimension (171) perpendicular to the wheel rotation axis (191). The handle (105) in FIG. 4 can then be rotated about the second axis (153) to get the position of FIG. 13. In particular, as can be seen in FIG. 1, the handle (105) is

effectively arranged so that the components form a generally square corner corresponding to the handle's (105) attachment and placement at the interface between the back (113) and the top (111) faces of the luggage (101) with the principal dimension (171) of the grip portion (134) being generally in the plane of the top face (111). At the expanded position, the user can take advantage of the first (151) and second (153) axes for rotation of the handle (105) to a comfortable position as shown in FIG. 10 or can maneuver the handle (105) using the two axes (151) and (153) in any way desired. In an alternative embodiment, the handle may instead align with the back face when the towing arm (103) is in the retracted position, but while still maintaining the axes of rotation and, in an embodiment, the principal dimension's (171) perpendicular arrangement to the wheel rotation axis (191).

So as to facilitate the "opening up" of the arrangement of components between FIGS. 5 and 6. The luggage (101) may include a "jump" mechanism which pushes the handle (105) up and out of receptacle (801) by "jumping" the arm portions (131) and (133) a little bit from their most retracted state towards their extended state when the user wishes to use the handle (105). FIG. 5 shows a handle (105) after it has been "jumped" making the handle (105) more easily accessible. This jump may be accomplished through the use of a spring mechanism biased toward a position with the towing arm (103) slightly extended and a locking mechanism which prevents the spring mechanism from so biasing the towing arm (103) until the locking mechanism is released. The release of the locking mechanism may be accomplished by pushing a button such as button (803) on the luggage (101). In an alternative embodiment, the receptacle (801) may simply have increased space available on the side of the grip portion (134) so that the user can reach into the receptacle (801) and grasp the grip portion (134) but that would generally decrease space in the luggage (101).

The jump mechanism may also initiate rotation about the third axis (155) or any other axis in order to make the handle (105) easier to grasp at the jumped position. In particular, the rotation about the third axis (155) may be such that the handle (105) is biased toward the position of FIG. 7 relative to third axis (155). That is, the intermediate arm (401) may rotate to the position of FIG. 7 without the user interacting with the handle (105), but purely on the initiation of the jump. This may also be carried out through the use of springs and locking mechanisms which may be part of or entirely different from the jump mechanism for the towing arm (103).

In another embodiment, the intermediate arm (401) may be moveable by the user relative to the third axis (155) by the user overcoming a biasing force. Therefore, the third axis (155) may be locked, may freely move, may be biased, or may be resiliently detained depending on the embodiment. In still another embodiment, rotation about the third axis (155) and the second axis (153) may be linked together. For instance the jump motion may simultaneously initiate rotation about any or all of the three axes (151), (153), and (155). Alternatively, rotation about none of the three axes (151), (153), or (155) may be included as part of the jump, and instead the rotations can be linked into any related pattern, or can all be independent.

It should be apparent from the discussion of the above embodiments how the towing member (100) can be easier on the wrist providing a more fluid extension than other types of rotating handle systems. However, operation of the towing member (100) will now be discussed. Generally, the user will begin by standing next to the luggage (101) facing the direction they will tow the luggage. At this time the luggage (101) is in the position of FIG. 1. As is well known, when the human hand hangs at the side of their body the hand is generally positioned so that a line through their grip from thumb to pinky finger and through the curled fingers extends forward and backward of their body with the fingers curled toward the body. This is a natural

and comfortable position for the hand which puts little strain on the wrist. When towing luggage (101), the wrist is preferably held at a position close to this and the luggage (101) will generally be towed in a direction perpendicular to the wheel rotation axis (191) as in FIG. 13.

When the user pushes the jump button (803), the handle (105) will jump slightly clearing the frame of the luggage and being generally in the position of FIG. 5. As should be apparent, if the user is facing in the direction they intend to pull the luggage, the principal dimension (171) of the grip portion (134) is generally parallel to the direction of motion as soon as the handle (105) jumps because it generally perpendicular to the wheel rotation axis (191) and parallel to the top face (111). Therefore, the user can grasp the grip portion (134) with their hand without having to twist their wrist to any significant degree toward or away from their body (although the line of grip may tilt up or down). Upon grasping the grip portion (134), the user can depress the button (143) to release the locking mechanism (if present). At this time the handle (105) rotation is preferably unlocked around all three axes (151), (153), and (155) (although any or all axes may still be resiliently detained as discussed in conjunction with the third axis (155)). The user can then pull out the handle (105) to telescope the arm portions (131) and (133). They may first telescope the towing arm (103) to the expanded position of FIGS. 2 through 4, and then tilt the luggage onto wheels (119) and to the position of FIG. 10, or simultaneously extend and tilt bypassing the arrangement of FIGS. 2 through 4 to go straight to the arrangement of FIG. 13. Regardless of which method is used, in the arrangement of FIG. 13, the user will then begin to move forward. Because of the first (151) and second axes (153) of rotation, the handle (105) can rotate relative to the bridge (135) so that the principle dimension (171) of the grip portion (134) ends up being approximately parallel to the user's motion in the preferred embodiment. Further,

the grip portion (134) can be placed in the hand so that it is held by the hand in the position with the hand naturally at the side.

As should be clear from the above discussion, the user can perform the steps of extending the handle (105) without having to twist his or her wrist hardly at all during the entire motion and only having to grasp the grip portion (134) in one hand. The towing member (100) instead rotates about the axes (151), (153) and (155). The user also can perform the motion without having to release the grip portion (134) from their hand to pass the grip portion through the poles (131) and (133). To stow the towing member (100), the steps above are simply reversed. As the handle (105) is arranged to be contracted when in use, the user simply uncurls their hand from the grip portion (134) and pushes down on the handle (105) to place it in the more compact arrangement of FIG. 6 and to seat it in the receptacle (801) and reengage the jump mechanism (if present) for the next use.

This towing member (100) provides significant ease over systems where the grip portion (134) is stowed above or below the bridge (135) with the primary dimension (191) parallel to the wheel rotation axis (191). The user does not need to pass the handle (105) between the poles (131) and (133) in order to get the handle (105) in the preferred towing position and does not need to grasp the handle with their wrist rotated.

While the invention has been disclosed in connection with certain preferred embodiments, this should not be taken as a limitation to all of the provided details. Modifications and variations of the described embodiments may be made without departing from the spirit and scope of the invention, and other embodiments should be understood to be encompassed in the present disclosure as would be understood by those of ordinary skill in the art.